All Things Toxic

When it is discovered that a toxicant in the environment may pose a threat to human health, a multitude of questions arise. People in the affected community want to know if they could have been exposed to the toxicant, and if so, whether they may get sick from the exposure, and how to avoid any risk the toxicant might pose. Physicians and epidemiologists need current information on how to diagnose and treat diseases related to exposure and whether or not there are populations at special risk to the particular chemical. Scientists and regulators must react quickly to appraise the potential danger and take effective action.

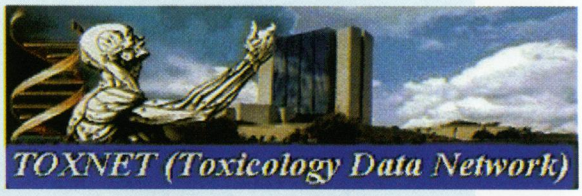
TOXNET, a large and evolving group of databases on toxic chemicals and their effects, provides officials with the information they need to make fast and accurate decisions. TOXNET was created by the National Library of Medicine and made available to the public in 1985. Access to TOXNET is free through the TOXNET home page located at http://toxnet.nlm.nih.gov.

One popular file on the TOXNET system is the Hazardous Substances Data Bank (HSDB), one of four databases available by following the Toxicology Data Search link on the TOXNET home page. For each toxic chemical in the database, the HSDB contains facts on substance identification, manufacturing and use, chemical and physical properties, safety and handling, toxicity and biomedical effects, pharmacology, environmental fate and exposure, standards and regulations, and other information used to assess the human health risk posed by the chemical. The data contained in the HSDB are collected from authoritative texts on toxic chemicals, including reports and monographs by organizations such as the International Agency for Research on Cancer, the World Health Organization, the American Council of Government Industrial Hygienists, and both federal and nonfederal agencies. To ensure the accuracy of the information, the data are evaluated by a scientific review panel, a group of nonfederal scientists with expertise in areas including chemistry, toxicology, pharmacology, and environmental fate. Information that has been reviewed by the panel is marked as peer-reviewed in the database.

The HSDB can be searched by entering a chemical name, Chemical Abstracts Service registry number, or subject on the Toxicology Data Search page. Clicking on the database name on the top of this page allows users to search three other similar TOXNET databases as well (the HSDB is selected by default). One of these databases, the Integrated Risk Information System, is a factual file maintained by the U.S. Environmental Protection Agency (EPA) on the carcinogenic and noncarcinogenic risks of chemical exposures. The system contains benchmark doses, describes the effects of exposure, and gives detailed descriptions of toxicological studies of the chemical performed prior to January 1998. The other two databases available under the Toxicology Data Search link are the Chemical Carcinogenesis Research Information System and GENE-TOX. These resources provide succinct summaries of mutagenicity, carcinogenicity, and genetic toxicology studies done on specific toxicants.

A search of any of these four databases will provide an abbreviated list of matching records. Pull-down menus at the top of the results page give users the option of viewing the full records on screen, having the results e-mailed directly to them, or having them provided via FTP.

In addition to the information available on these databases, TOXNET also provides several databases of health-related literature citations, which can be accessed by selecting the Toxicology Literature Search link on the home page. The Developmental and Reproductive Toxicology database contains citations for studies published after 1989 on birth defects and developmental effects of toxicants. The Environmental Mutagen Information Center contains citations for studies published since 1991 on the genotoxic activity of chemical, biological, and physical agents. Each of these bibliographic databases has an associated archive of earlier citations. The search results from these databases contain full abstracts for most studies.



For broader literature searches, TOXNET also provides a link to Internet Grateful Med, the online interface to the National Library of Medicine's broad collection of bibliographic databases. By following this link, users can not only continue searching for toxicology-related literature in Grateful Med's TOXLINE database, but can also search MEDLINE, AIDSLINE, BIOETHICSLINE, or eleven other health-related databases.

While the information available through these literature databases may be helpful for doctors and scientists who need to evaluate and control the health effects of a toxicant, it cannot answer questions concerning where the toxicant comes from and how it enters the environment. However, the EPA's Toxics Release Inventory (TRI) database, which is also available through TOXNET, can help answer such questions. The TRI is reports made by industries to the EPA that estimate how much of each toxicant industrial facilities release into the environment each year. Recently, information on reduction and recycling of chemicals has also been included in these reports. Following the Toxic Releases Search link on the TOXNET home page brings users to a form that allows them to search through past years' TRIs, limiting their results by chemical name, registry number, facility name or number, parent company name, state, county, city, amount of release, and environmental medium (air, land, water, or underground injection).

The TOXNET site effectively organizes and presents the enormous amount of information that has been generated on toxic chemicals and their effects. When it comes to addressing public health risks, TOXNET can save time and effort, and that may help save lives.